

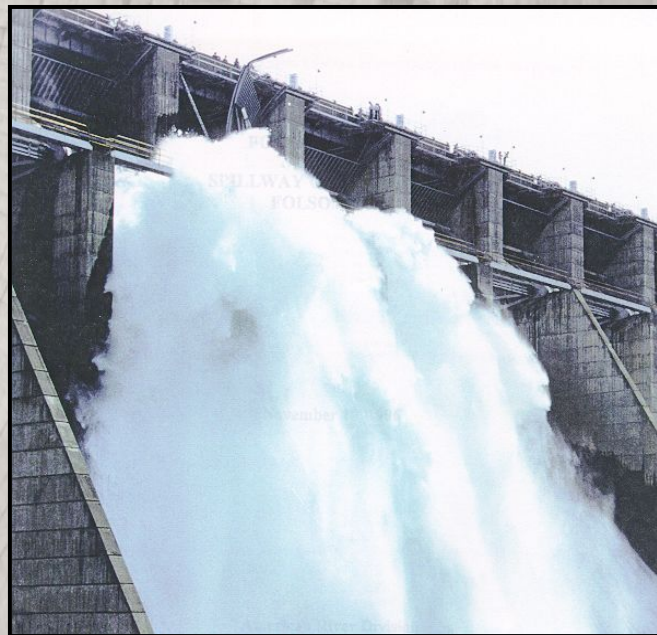
RECLAMATION

Managing Water in the West



US Army Corps of Engineers
BUILDING STRONG®

Dam Safety Risk Analysis Best Practices Training Manual



U.S. Department of the Interior
Bureau of Reclamation
In Cooperation with the U.S. Army Corps of Engineers
Denver, Colorado

Version 2.2 – April 2011

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Dam Safety Risk Analysis Best Practices Training Manual

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This manual was developed for internal use. The authors and agencies make no guarantees as to the accuracy or applicability of the information presented herein.



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Preface

The Bureau of Reclamation has been using risk analysis as the primary support for dam safety decision-making for over 15 years, and has developed procedures to analyze risks for a multitude of potential failure modes. Manuals, guidelines, and practical reference material detailing risk analysis methodology for dam safety applications are generally lacking. This training manual attempts to help fill that need. It contains what are considered the “Best Practices” currently in use for estimating dam safety risks at the Bureau of Reclamation. Risk analysis at the Bureau of Reclamation has evolved over the years and will continue to evolve.

From the outset of implementing risk analysis, Reclamation recognized that procedures and data available for dam safety risk analysis, while quantitative, do not provide precise numerical results. Therefore, this manual strives to present useful information, tools, and techniques, while stopping short of a “cookbook” approach. This allows the risk analyst(s) to use the proper balance of engineering judgment and calculations in estimating risks, and to understand and “build the case” for what most influences the risk. Thus, the numbers, while important, are less important than understanding and documenting what the major risk contributors are and why.

The Bureau of Reclamation conducts risk analysis at different levels, from screening level analyses performed by an individual (with peer review) during a Comprehensive Facility Review (CFR), to full blown facilitated team risk analyses, which include participation by “field” personnel. It is envisioned that the tools presented in this manual can be used for any level of risk analysis. The primary difference will be the level of detail to which the analyses are carried. These differences are noted where appropriate.

By definition, “risk” is the product of the likelihood of an adverse outcome and the consequences of that outcome. The likelihood of an adverse outcome is the product of the likelihood of the loading that could produce that outcome and the likelihood that the adverse outcome would result from that loading. This manual covers primarily “risk analysis”, or the development of risk estimates. “Risk assessment,” or the process of evaluating the risks and determining the best course of action is not discussed in detail, although the section on Public Risk Tolerance and Risk Guidelines provides an introduction to this topic.

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